

AN OPERATION IRAQI FREEDOM CASE STUDY OF COMBAT
ENGINEER BATTALION SUPPORT TO STABILITY AND
RECONSTRUCTION OPERATIONS

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General Studies

by

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The opinions and conclusions expressed herein are those of the student author and do not necessarily represent the views of the US Army Command and General Staff College or any other governmental agency. (References to this study should include the foregoing statement.)

ABSTRACT

AN OPERATION IRAQI FREEDOM CASE STUDY OF COMBAT ENGINEER BATTALION SUPPORT TO STABILITY AND RECONSTRUCTION OPERATIONS
by MAJ Christopher T. Kuhn, 87 pages.

The employment of full-spectrum operations is critical in winning the war in Iraq, and stability and reconstruction operations play a key part in success or failure. The purpose of this thesis is to assess and analyze the support of the US Army Combat Engineer Battalions to stability and reconstruction (S&R) operations in Operation Iraqi Freedom (OIF). The research question is: Were the combat engineer battalions deployed during OIF properly organized to conduct stability and reconstruction operations? The combat engineer battalions faced significant organizational problems as they conducted S&R operations. These problems were determined by the requirements of combat engineer battalions in OIF. This thesis identifies these problems and the battalions' solutions to determine any shortfalls or requirements for adjustment for combat engineer battalions as they conduct stability and reconstruction operations in the future. The research found that the combat engineer battalions were not properly organized, but were successful due to flexible and adaptable leaders and Soldiers. However, the combat engineer battalion organization can improve by addressing training shortfalls and resourcing the battalions with additional equipment.

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ACRONYMS

AAR	After Action Review
AC	Active Component
AO	Area of Operations
BCT	Brigade Combat Team
C2	Command and Control
CE	Civil Engineering
CERP	Commander's Emergency Relief Program
CS	Combat Support
CSE	Construction Support Equipment
CSS	Combat Service Support
DOD	Department of Defense
EOD	Explosive Ordnance Disposal
ERT	Engineer Reconnaissance Team
FBCB2	Force XXI Battle Command, Brigade, and Below
FEF	Future Engineer Force
FM	Field Manual
GE	General Engineering
HMMWV	High-Mobility Multipurpose Wheeled Vehicle
HN	Host Nation
ICE	Infrastructure Coordination Element
IED	Improvised Explosive Device
I-FEST	Iraqi Forward Engineer Support Teams
JP	Joint Publication

LOGCAP	Logistics Civilian Augmentation Program
MOUT	Military Operations in Urban Terrain
METL	Mission Essential Task List
MTOE	Modified Table of Organization and Equipment
NGOs	Nongovernmental Organizations
OIF	Operation Iraqi Freedom
ORHA	Office of Reconstruction and Humanitarian Assistance
RC	Reserve Component
S&R	Stability and Reconstruction
SINCGARS	Single Channel Ground and Airborne Radio System
SSTR	Stability, Security, Transition, and Reconstruction
TACSAT	Tactical Satellite
USACE	United States Army Corps of Engineers
UXO	Unexploded Ordnance

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CHAPTER 1

INTRODUCTION

Throughout the campaign, offensive, defensive, stability, and support missions occur simultaneously. As missions change from promoting peace to deterring war and from resolving conflict to war itself, the combinations of and transitions between these operations require skillful assessment, planning, preparation, and execution. (FM 3-0 2001, 1-16)

US Army, *Operations*

Background

The Army conducts full-spectrum operations to accomplish missions across the range of military operations. Full-spectrum operations include the simultaneous and continuous combination of offensive, defensive, stability, and reconstruction operations. These operations are often conducted as part of joint, interagency, and multinational teams. Offensive and defensive operations typically dominate operations in war, while stability and reconstruction operations typically dominate in lower-intensity-type conflicts. According to Field Manual (FM) 1, *The Army*, “The skills Army forces require to conduct one type of operation complement those required to conduct other types of operations. The perceived ability of Army forces to attack and destroy enemies contributes to success in stability and reconstruction operations by deterring potential threats. Conversely, stability and reconstruction operations reduce the chance of offensive and defensive requirements by influencing civilians to not support enemy efforts” (2005a, 3-7).

The employment of full-spectrum operations is critical in winning the war in Iraq and stability and reconstruction operations continue to play a greater role as each month

passes. On 1 May 2003, President Bush declared an end to major combat operations in Iraq. This declaration marked the day the Army would transition from predominantly offensive operations to stability and reconstruction operations. As this transition took place, the role of the Army engineers took on a greater significance. The engineering focus shifted from combat engineering, consisting of mobility, countermobility, and survivability tasks, to a general engineering focus. When in power, Saddam Hussein neglected much of the infrastructure and essential services of the country. Degraded roads, bridges, power grids, sanitation services, and sewage systems were just a few of the problems that faced the Army, which also had to focus on providing security throughout the country.

The Engineer Regiment organizes and fights with the Army's maneuver forces to win the nation's wars and achieve its national objectives. "Engineer forces can be tailored to support operations in austere environments, with little or no infrastructure, and provide mobility and enhance force protection through countermobility and survivability" (FM 3-34 2004b, 1-1). Engineers also provide support through geospatial and general engineering and have the capability to support light, heavy, and special operations forces. The ability of the Engineer Regiment to perform these different functions and bring multiple capabilities enhances their role as a key asset in support of stability and reconstruction operations.

The Engineer Regiment supports the Army's mission essential task list (METL) by focusing on its own METL, which includes: (1) shape the security environment, (2) respond promptly to crisis, (3) mobilize engineer forces, (4) support forcible entry operations, (5) support assured mobility to dominate land operations, (6) provide support

to civil authorities, and (7) provide quality, responsive engineering services to the nation (FM 3-34 2004b, 16). Engineer tasks and support to stability and reconstruction operations are derived from this METL. Shaping the security environment to support stability operations in foreign countries and providing support to civil authorities is one example of assisting with reconstruction operations. This METL provides the foundation for specific tasks, organizations, and capabilities required of engineer units to conduct stability and reconstruction.

This thesis is a case study analyzing the types of engineer tasks conducted by combat engineer battalions in support of stability and reconstruction operations during Operation Iraqi Freedom (OIF), focusing on the period of May 2003 through December 2005. First, the thesis will examine the current engineer doctrine regarding stability and reconstruction operations. Secondly, the case study will describe the organization of the combat engineer battalion during the stated time period. Thirdly, the thesis will discuss the requirements and tasks conducted by the combat engineer battalions. Lessons learned will be used to identify any shortfalls or requirements for adjustment based on various units' experiences during the case study. Finally, the thesis will provide recommendations for the Future Engineer Force (FEF) with regards to the organization and capabilities required of combat engineer battalions in support of stability and reconstruction operations. These recommendations must be considered in relative terms with the changing environment and conditions found in Iraq as the nation moved from regime change to establishing a new government.

Primary Research Question

The purpose of this thesis is to assess and analyze the support of the US Army Combat Engineer Battalions to stability and reconstruction (S&R) operations in OIF. The primary question is: Were the combat engineer battalions deployed during OIF properly organized to conduct stability and reconstruction operations?

Secondary Research Questions

To address the primary thesis question the following secondary questions must be answered:

1. What engineer doctrine currently exists that specifies the tasks that engineers should conduct in S&R operations?
2. What types of engineer tasks were conducted in support of S&R in OIF during the specified time period?
3. What engineer capabilities are required to conduct S&R operations?
4. What is the required engineer staff capability?
5. How were the combat engineer battalions organized?
6. How do engineer units assess, analyze, and determine the requirements necessary to conduct missions in support of S&R operations?
7. How do the host nation capabilities to conduct S&R operations affect US Army Engineer involvement?
8. How did contracting affect the engineer missions?

Research Methodology

To answer the primary and secondary research questions the thesis will use a five step qualitative research methodology. The following steps describe the methodology:

1. Define and describe stability and reconstruction operations and the current engineer doctrine that supports stability and reconstruction operations.
2. Describe the combat engineer battalion organization in OIF during the time period of May 2003 through December 2005.
3. Outline the requirements of combat engineer battalions in support of stability and reconstruction operations, based on unit experiences in OIF.
4. Identify and describe any problems combat engineer battalions faced in OIF and how they developed solutions for those problems.
5. Compare the solutions by the different combat engineer battalions to identify any shortfalls or requirements for adjustment.

The research methodology is explained in greater detail in chapter 3, “Research Methodology.”

Assumptions

1. Although the situation in Iraq contains its own unique conditions and environment, an analysis of the engineer missions will provide valuable lessons that can be applied to other situations, conflicts, or scenarios that require engineer support to stability and reconstruction operations. These lessons are valuable because this case study is the most recent example of combat engineer battalions conducting stability and reconstruction operations under an extreme set of conditions.

2. FM 3-34, *Engineer Operations*, defines the basic organization of a combat engineer battalion. This description of the organization of a combat engineer battalion provides the structure of the combat engineer battalions in OIF for this case study. The battalion organization does not change throughout the time period specified.

Operational Definitions of Key Terms

The following terms will be used in this study:

Civil Augmentation Program. Standing, long-term contracts designed to augment service logistic capabilities with contract support in both preplanned and short notice contingencies; examples include US Army Logistics Civilian Augmentation Program (LOGCAP), US Air Force Contract Augmentation Program, and US Navy Construction Capabilities Contract (FM 3-34 2004b, Glossary-7).

Civil Engineering (CE). Those combat support (CS) and combat service support (CSS) activities that identify, design, construct, lease, or provide facilities and which operate, maintain, and perform war damage repair and other engineering functions in support of military operations (FM 3-34 2004b, Glossary-7).

Combat Engineering. Those engineering tasks that assist the tactical and or operational commander to shape the battlespace by enhancing mobility, creating the space or time necessary to generate mass and speed while protecting the force, and denying mobility and key terrain to the enemy; these tasks include breaching, bridging and emplacement of obstacles to deny mobility to the enemy; one of the engineer battle space functions that includes mobility, countermobility, and survivability (FM 3-34 2004b, Glossary-8).

Engineer Regiment. All active component (AC) and reserve component (RC) engineer organizations (as well as the DOD civilians and affiliated contractors and agencies within the civilian community) with a diverse range of capabilities that are all focused toward supporting the Army and its warfighting mission (FM 3-34 2004b, Glossary-14).

Future Engineer Force (FEF). The engineer force that provides critical modular, scalable, mission-tailored, multifunctional capabilities for the Army. The Future Engineer Force represents continual improvement and is designed to look ten to twenty years into the future to determine the capabilities and the organizational and functional architecture of modular engineer units that will support capabilities-based brigade combat teams (BCTs) (The United States Army Future Engineer Force Concept Capability Plan 2005b, 2-1).

General Engineering (GE). Encompasses the construction and repair of lines of communication, main supply routes, airfields, and logistic facilities to support joint military operations and may be performed in direct support of combat operations, such as battle damage repair; these operations include both horizontal and vertical construction, and may include use of both expedient repair methods and more deliberate construction methods characterized by the application of design criteria, advanced planning, and preparation, depending on the mission requirements; one of the engineer battlespace functions (FM 3-34 2004b, Glossary-20).

Stability and Reconstruction (S&R) Operations. The sustainment and exploitation of security and control over areas, populations, and resources. Stability and reconstruction operations employ military capabilities to reconstruct or establish services

and support civilian agencies. Stability and reconstruction operations involve both coercive and cooperative actions and may occur before, during, and after offensive and defensive operations; however, they also occur separately, usually at the lower end of the range of military operations. Stability and reconstruction operations lead to an environment in which, in cooperation with a legitimate government, the other instruments of national power can predominate (FM 1 2005a, 3-7).

Limitations

Several limitations will influence the scope and analysis of this research.

1. OIF is a specific case study under unique conditions that may or may not be experienced in future conflicts. This case study deals with a regime change which directly impacted the amount of host nation support available to assist stability and reconstruction operations.

2. The use of Commander's Emergency Relief Program (CERP) funds utilized by commanders to hire local Iraqi contracting was unique to the operations in OIF. This program was used to deal with the unusual circumstances and conditions that resulted from the regime change. This program was not used prior to Iraq and is not necessarily a permanent system to be used in future operations.

3. Continuing and changing information: Studying an operation while it is still ongoing presents the researcher with the problem of increasing amounts of information. This may cause difficulty for the researcher to process all the information available and applying it to the thesis. This thesis represents data collected during the specified period only to eliminate this problem.

Delimitations

1. The research will focus only on combat engineer battalions and their missions that support stability and reconstruction operations.

2. The time period for this case study will focus on operations from 1 May 2003 through 31 December 2005.

3. This thesis will only address stability and reconstruction operations and not major combat operations.

Scope

The scope of this research project includes combat engineering battalion support to stability and reconstruction operations during the period that began with the announced cessation of major combat operations and concluded after the general elections were conducted in December 2005. The intent is to examine the requirements and capabilities necessary to successfully conduct stability and reconstruction operations and then determine any strengths, shortcomings, or trends.

Significance

Currently the war in Iraq is still in progress and appears that it may continue for some time to come. President Bush has indicated that the US will remain in Iraq until there is peace. The contribution of this thesis is to provide further information to the ongoing discussion about the future development of the combat engineer battalion's organization and mission.

Summary

Chapter 1, “Introduction,” presents the background and expansion on the primary research question: Were the combat engineer battalions deployed during OIF properly organized to conduct stability and reconstruction operations? This thesis will answer the primary question by examining engineer missions conducted by combat engineer battalions in Iraq in support of stability and reconstruction operations. It will determine any strengths or shortfalls and provide recommendations for the future development of combat engineer battalions. This chapter also presents a series of assumptions, definitions, limitations, delimitations, and explains the scope and significance of the study. Chapter 2, “Review of Literature,” will evaluate the existing literature relevant to the thesis and identify any patterns or gaps.

CHAPTER 2

LITERATURE REVIEW

There is another type of warfare – new in its intensity, ancient in its origin – war by guerillas, subversives, insurgents, assassins; war by ambush instead of by combat, by infiltration instead of aggression, seeking victory by eroding and exhausting the enemy instead of engaging him. . . . It prays on unrest. . . . Our forces, therefore, must fulfill a broader role, as a complement to our diplomacy, as an army of our diplomacy, as a deterrent to our adversaries, and as a symbol to our allies of our determination to support them. (FM 3-07 2003, 3-3)

John F. Kennedy

Chapter 1 describes the primary research question, its secondary questions, and the scope and significance of this research project. The purpose of this chapter is to briefly evaluate the existing literature relevant to the thesis and identify any patterns or gaps. The review of literature will present a synopsis of existing works relevant to the research topic in five broad categories: (1) stability and reconstruction operations, (2) engineer doctrine that supports stability and reconstruction operations, (3) the organization of a combat engineer battalion, (4) engineer operations in OIF, and (5) after-action reviews (AARs), observations, and lessons learned.

Stability and Reconstruction Operations

Department of Defense Directive Number 3000.05, *Military Support for Stability, Security, Transition, and Reconstruction (SSTR) Operations*, provides guidance on stability operations that will evolve over time as joint operating concepts, mission sets, and lessons learned develop. The directive also establishes Department of Defense (DOD) policy and assigns responsibilities within the DOD for planning, training, and

preparing to conduct and support stability operations. This DOD directive was published in November of 2005 and is the most recent document released from the DOD dealing with stability and reconstruction operations. This document supersedes any conflicting documents previously published by the DOD dealing with stability and reconstruction operations.

Definitions of stability operations and military support to stability, security, transition and reconstruction (SSTR), as well as the establishment of the DOD's policy on military support to SSTR are some key elements of this directive. Some key points of the policy as stated in Department of Defense Directive Number 3000.05 are as follows:

Stability operations are a core U.S. military mission that the DOD shall be prepared to conduct and support. They shall be given priority comparable to combat operations and be explicitly addressed and integrated across all DOD activities including doctrine, organizations, training, education, exercises, material, leadership, personnel, facilities, and planning.

.....
The immediate goal often is to provide the local populace with security, restore essential services, and meet humanitarian needs. The long-term goal is to help develop indigenous capacity for securing essential services, a viable market economy, rule of law, democratic institutions, and a robust civil society.

.....
Many stability operations tasks are best performed by indigenous, foreign, or U.S. civilian professionals. Nonetheless, U.S. military forces shall be prepared to perform all tasks necessary to establish or maintain order when civilians cannot do so. (2005, 2)

Integrated civilian and military efforts are key to successful stability operations.

.....
Military plans shall address stability operations requirements throughout all phases of an operation or plan as appropriate (2005, 3).

This document provides a foundation for the Army for planning and preparation of stability and reconstruction operations. The release date of this DOD document minimizes the impact it has on the combat engineer battalion operations in support of

stability and reconstruction during the time period studied. This document will be more influential for future operations involving stability and reconstruction.

Stability and Reconstruction Operations Engineer Doctrine

There are multiple doctrinal publications published by the Department of the Army and the Department of Defense that provide guidance for engineers in support of stability and reconstruction operations. FM 3-34, *Engineer Operations*, published in 2004, is the most recent and important document that provides the basis for discussion in this thesis. This manual provides the foundation for the different operations the Engineer Regiment performs.

FM 3-34 defines the roles of engineers. Engineers conduct combat arms, combat support (CS), and combat service support (CSS) operations. Combat arms are those units and soldiers who close with and destroy enemy forces or provide firepower and destructive capabilities on the battlefield. Many engineers are task organized into combined arms formations and provide demolition and reduction capabilities. In the combat support role, engineers provide full-combat, geospatial, and general engineering capabilities. CS engineers may also advise the maneuver commander on the effective use of terrain; construction efforts; improvement and maintenance of routes, bridges, and airfields; and reorganization to fight as infantry, when required. CSS engineers sustain the momentum of the force they support. General engineering is the primary CSS engineer function. In this particular case study the combat engineer battalions were required to execute all three roles of combat arms, CS, and CSS. The details of these roles will be described in chapter 4, "Analysis."

FM 3-34 describes the engineer support to stability and support operations. All five engineer functions (mobility, countermobility, survivability, geospatial, and general) must operate simultaneously. The engineer staff planners should consider if there are host nation (HN), third party non-governmental organizations (NGOs), or other multinational forces involved. Interaction with these other parties requires engineers to address interoperability, common standards, and mutual agreements.

To prepare for stability operations it is necessary to conduct an engineer assessment. The assessment is critical to tailor the engineer force properly and to logistically support the follow-on engineer contingency operations force. The engineer assessment identifies:

- Status of the infrastructure in the area of operations (AO), to include airfields, roads, ports, logistics bases, and troop bed-down facilities; real estate acquisition; environmental standards, conditions, and considerations; construction material supply; construction management; and line-haul requirements (FM 3-34 2004b, 8-10).
- Theater and situation-specific force protection requirements (FM 3-34 2004b, 8-10).
- Existing geospatial product availability and requirements for new terrain products (FM 3-34 2004b, 8-10).
- Specialized engineer requirements such as prime power, well-drilling, and fire fighting support (FM 3-34 2004b, 8-10).
- Engineer command and control (C2) requirements, including headquarters staffing, communications, and information systems support (FM 3-34 2004b, 8-10).
- Engineer liaison requirements, including linguists and civil affairs personnel (FM 3-34 2004b, 8-10).
- Requirements for officers with contracting officer's representative or US Army Corps of Engineers (USACE) experience (FM 3-34 2004b, 8-10).

- Potential requirements for LOGCAP, contractor responsibilities, contract-construction procedures, and initial work areas (FM 3-34 2004b, 8-10).

This assessment is continually updated as the conditions in the theater of operations change.

Support operations provide essential services, assets, or specialized resources to help civil authorities deal with situations beyond their capabilities. Such resources that engineers provide include: technical advice and assessments, engineering services, construction management and inspection, emergency contracting, emergency repair of wastewater and solid waste facilities, and real estate support.

FM 3-34 is the Engineer Regiment's capstone manual for operating in today's operational environment and is linked to joint and Army doctrine. All other engineer FMs are based on the principles and tenets found in this manual and are synchronized with their respective joint publications (JPs). FM 3-34 is built on the concepts of FMs 3-0, *Operations*; FM 3-90, *Tactics*; and FM 3-07, *Stability Operations and Support Operations*, with blending key points of JPs 3-0, *Doctrine for Joint Operations*; JP 3-34, *Engineer Doctrine for Joint Operations*; and JP 4-04, *Joint Doctrine for Civil Engineering Support*.

As stated above, FM 3-07, *Stability Operations and Support Operations*, published in 2003, contributed to the development of FM 3-34. FM 3-07 discusses the distinct characteristics of stability operations and support operations. This is of note since FM 3-34 and DOD Directive Number 3000.05 do not consider these two types of operations exclusive of each other.

FM 3-07 provides the analytical framework needed to evaluate a stability operation or a support operation. The manual broadly defines stability operations and

support operations. It describes both US policies relating to these actions and the Army's role in them. The manual discusses, in detail, the different types of stability operations and support operations as well as planning considerations for them. The planning considerations discussed in this manual are very similar to the planning considerations discussed in FM 3-34.

US forces conduct stability and support operations to deter war, resolve conflict, promote peace, strengthen democratic processes, retain US influence or access abroad, assist US civil authorities, and support moral and legal imperatives. These operations may complement and reinforce offensive and defensive operations. Stability and support operations may take place before, during, and after offensive and defensive operations (FM 3-07 2003, 1-3).

Engineers provide essential support during stability and support operations to ensure a mobile and survivable force. Planners consider available capabilities, to include: joint services, multinational forces, contractors, and troop units (including US Reserve and National Guard). Planners also consider personnel or materiel assets available through contracts, local sources, and private agencies, including LOGCAP (FM 3-07 2003, 2-8).

FM 3-07 states that general engineering missions can assist the HN by constructing facilities and supporting government or civil agencies. Engineers may also teach basic skills to indigenous civilian and military personnel and then work together on projects that support HN institutional and infrastructure development (FM 3-07 2003, 2-9).

JP 3-34, *Engineer Doctrine for Joint Operations*, published in 2000, provides the guidance and procedures necessary to plan, coordinate, and conduct timely and tailored joint engineer operations across the range of military operations. This manual covers authorities and responsibilities for engineer operations, provides the joint engineer fundamentals, discusses command and control options for engineer forces, provides planning considerations for engineer operations, and provides guidance on the conduct of engineer operations. FM 3-34 incorporated many of the concepts discussed in JP 3-34 into its development to ensure that the Army doctrine was synchronized with the joint doctrine. JP 3-34 covers the same concepts as FM 3-34, just on a broader scale with relation to joint forces.

FM 5-104, *General Engineering*, provides a doctrinal basis for the planning and execution of general engineering in the Theater of Operations. This manual describes the responsibilities, relationships, procedures, capabilities, constraints, and planning considerations in the conduct of general engineering tasks.

General engineering sustains military forces in the theater through the performance of facility construction and repair as well as through acquisition, maintenance, and disposal of real property. General engineer requirements are based on an analysis of the terrain, the availability of support infrastructure, the logistical and combat force structure to be supported, and the extent of damage to existing facilities. These requirements drive the general engineering planning process. Some planning considerations include HN support, contract labor, construction criteria, and logistics.

After the plan is developed the construction materials must be produced and procured. These materials can come through the military logistical systems, procured

from local manufacturers, produced from natural materials, or produced from processing. General engineering projects can consist of the construction of airfields, heliports, roads, bridging, railroads, water supply, facilities, utilities, and ports.

The current engineer doctrine in support of stability and reconstruction operations discusses the planning considerations and outlines the types of tasks, in general terms, which are conducted in this type of environment. However, the doctrine does not discuss the specific types of units or staff capability required to conduct these tasks.

Combat Engineer Battalion Organization

This section describes the doctrinal organization of a combat engineer battalion that provides combat and general engineering capabilities to the maneuver commander during offensive, defensive, and stability and reconstruction operations. The focus is on the division echelon, but the thesis will also address combat engineer battalions at the Corps level as well. FM 3-34, *Engineer Operations*, chapter six, describes the unit organization. The unit organization described in FM 3-34 accurately depicts the unit organization of the various combat engineer battalions that served in OIF during the time period specified for this case study.

At the corps level, engineers perform battlespace functions (combat, geospatial, and general engineering) and have missions in all parts of the corps area. The general engineering mission in the corps AO is to construct and maintain the lines of communication and tactical march routes. This mission is continuous due to the effects of enemy actions, heavy traffic, and weather (FM 3-34 2004b, 6-8).

Corps engineer units operating in the forward area reinforce divisional engineers in combat engineering roles. Corps engineer units are typically combat support engineers.

They usually perform mobility, countermobility, and survivability missions when operating in the division area as reinforcement to divisional engineers (FM 3-34 2004b, 6-9).

Separate corps brigades and armored cavalry regiments have an organic engineer company, which is usually not sufficient to handle all required engineer tasks when these units are committed. These companies are designed and focused for supporting the mobility and countermobility portions of combat engineering. The corps engineer brigade reinforces these organizations with additional combat battalions and separate companies based on the mission and the situation (FM 3-34 2004b, 6-10).

Corps combat engineer battalions perform general engineering tasks in the division area. Combat support companies augment the combat battalions with equipment to move earth and maintain or create horizontal surfaces, such as roads and airstrips. Combat battalions may also assemble tactical bridges provided by panel-bridge companies or allocated from theater stocks for use on lines of communication and other routes. Multirole bridge companies erect their own tactical bridges (fixed and floating) to support river crossing operations (FM 3-34 2004b, 6-10). Figure 1 depicts a typical corps engineer brigade supporting three heavy divisions.

Divisions perform major tactical missions and can conduct sustained battles and engagements. The engineer forces organic to each division are tailored specifically to support that type of division. The corps engineer brigade provides additional engineer units based on the division's specific mission and tactical situation. The engineer infrastructure at the higher echelons makes it possible to commit and sustain divisions in combat (FM 3-34 2004b, 6-10 to 6-11).

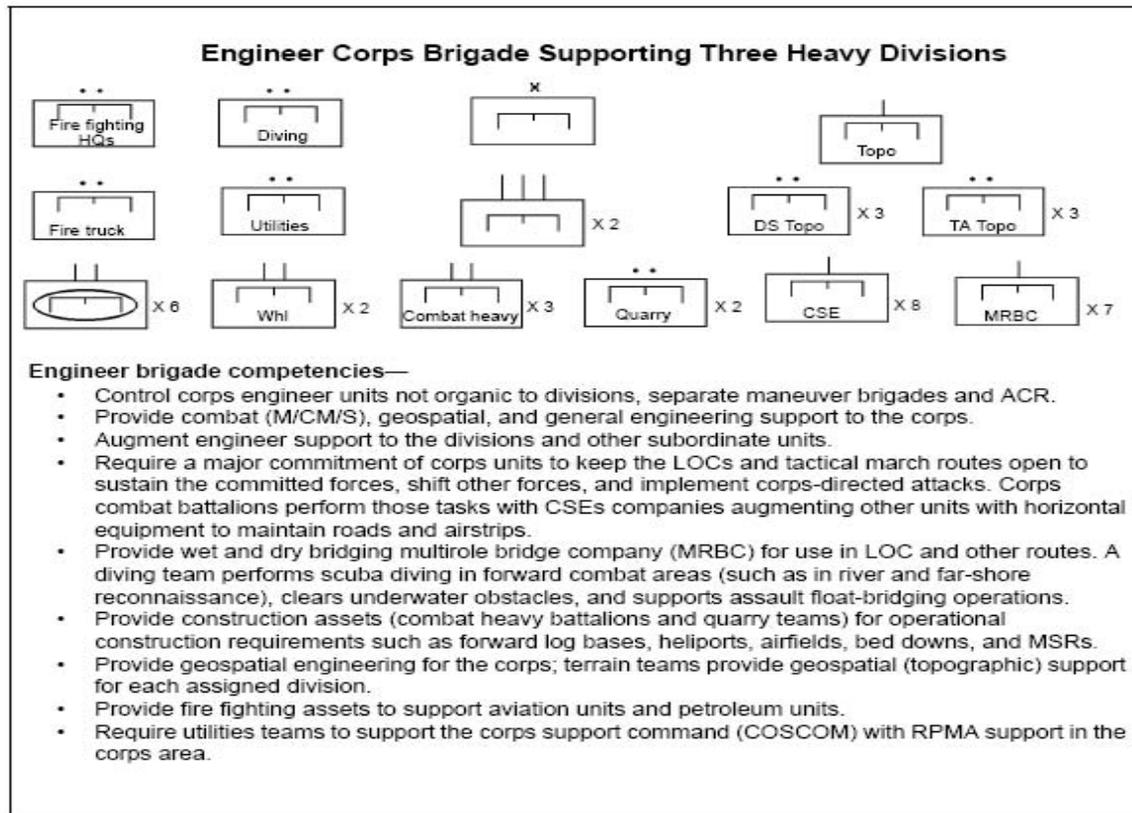


Figure 1. Engineer Corps Brigade Supporting Three Heavy Divisions
 Source: US Army, 2004b, FM 3-34, *Engineer Operations* (Fort Leonard Wood, MO: US Army Training and Doctrine Command, US Army Engineer School), 6-9.

There are three combat engineer battalions organic to an engineer brigade, heavy division. Each battalion consists of one Headquarters and Headquarters Company and three line companies (see figure 2). The division combat engineer battalion is designed to perform the combat engineering functions and to participate in the close fight. A corps commander will usually place at least one corps combat engineer battalion in a command relationship to a division or an engineer group supporting a division to reinforce the close fight. Corps and division engineer elements often reorganize elements to enhance the relative capabilities and strengths of each. The headquarters of the habitually associated

engineer battalion generally commands all engineers supporting the major effort of a brigade. A notable exception to this may be in a light division where only an engineer company is habitually associated to a maneuver brigade. For example, there is only a single organic engineer company in the Stryker Brigade Combat Team. Each committed heavy maneuver brigade normally needs the equivalent of an engineer battalion or one company per battalion task force (FM 3-34 2004b, 6-11).

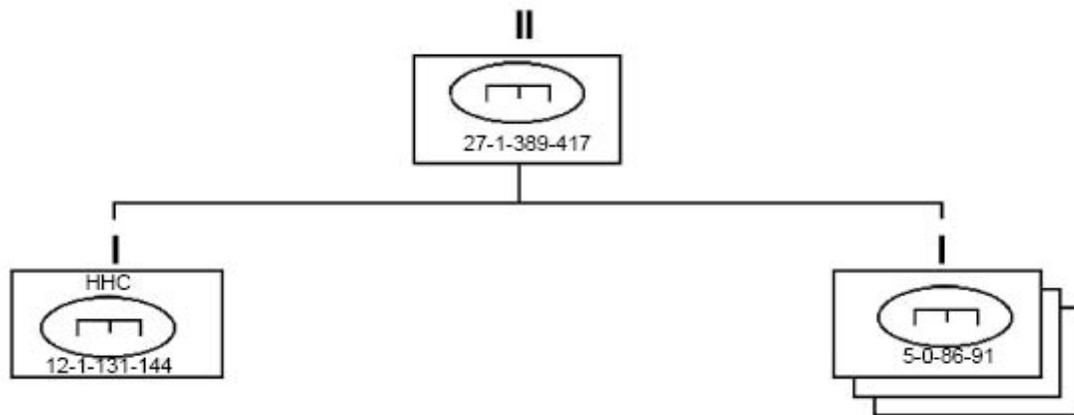


Figure 2. Combat Engineer Battalion, Heavy Division

Source: US Army, 2004b, FM 3-34, *Engineer Operations* (Fort Leonard Wood, MO: US Army Training and Doctrine Command, US Army Engineer School), D-25.

Additional corps engineer battalions operate in the division on an area or mission task basis. Separate engineer companies, especially bridge companies, operate in support of the division as required. When a division has the priority and need for a large number of corps engineers, it will likely also have an engineer group in support to control the activities of these engineers (FM 3-34 2004b, 6-11).

Combat engineer units rarely perform general engineering tasks within the division since their focus is on combat engineering tasks. General engineering tasks

within the division are typically performed by corps level or higher combat support engineer units (FM 3-34 2004b, 6-11).

Integrating the variety and special capabilities of engineer organizations requires an understanding of the various capabilities and limitations of the engineer assets available for any given mission. Besides Army engineers, there are a variety of other organizations that may be available to support the overall effort. These organizations include USACE, other US and allied military service engineers, and HN engineer capabilities (FM 3-34 2004b, 6-12).

It is increasingly common to contract a wide range of engineer services with local or third party national organizations and civilian contractors. These assets are typically used to free up military assets, minimizing the military footprint in a theater, when requirements exceed military capabilities or when the engineer operations and requirements are to be conducted in areas that are relatively safe from active combat (FM 3-34 2004b, 6-12).

Engineer Operations in OIF

To help describe the various missions conducted by engineers this thesis will review multiple unit AARs and articles written by Soldiers detailing their experiences. The AAR of the 3rd Infantry Division discusses the missions that the engineer brigade conducted. The missions consisted of breaching obstacles, building a C-130 airstrip, marking and clearing routes, conducting traffic control, clearing bridges of demolitions, emplacing tactical bridges, constructing and maintaining main supply routes, and conducting reconnaissance. The engineer brigade was also responsible for restoring power, water and sewage utilities to the city of Baghdad.

The *4th Infantry Division Lessons Learned Executive Summary* states that the division conducted multiple civil-military operations. It spent nearly \$300 million funding nearly 3,000 projects improving water, sanitation, electricity, and the overall quality of life for the people of Iraq.

The article “Victory Sappers: V Corps Engineers in Operation Iraqi Freedom, Part I: The Attack to Baghdad and Beyond...”, written by COL Gregg Martin and CPT David Johnson, the 130th Engineer Brigade Commander and V Corps staff officer, respectively, describes the operations conducted by engineers assigned to V Corps. This article, found in the July-September 2003 issue of *Engineer Magazine*, discusses the role engineers played during the initial attack and during stability and support operations. The various units conducted several missions, such as breaching obstacles; maintaining main supply routes; clearing and opening airports; developing logistics support areas and convoy support centers; emplacing bridges; conducting urban operations; repairing infrastructure; providing community assistance; and conducting riverine patrols.

COL Martin wrote another article, published in the October-December 2003 issue of *Engineer Magazine*, titled “Victory Sappers: V Corps/CJTF-7 Engineers in Operation Iraqi Freedom, Part 2: Since the Liberation...” In this article, COL Martin discusses the various missions conducted by every type of unit within the US Army Engineer Regiment (active duty, National Guard, Reserve, and civilian), as well as engineers from the Marine Corps, Navy, Air Force, and coalition forces. Some of the missions included combat engineer and infantry missions, as well as the construction and repair of infrastructure, base camps, and facilities. The above missions are just a sampling of the missions listed by COL Martin.

Once maneuver forces secured their areas of operations, “the priority of engineer effort was to provide mobility, survivability, and general engineering support to V Corps forces to allow the Iraqis to rebuild their nation, establish a stable government, and develop a peaceful, prosperous society (Martin 2003, 6). Reconstruction of civil infrastructure and humanitarian construction in support of the Iraqi people were to be accomplished by civilian contractors under the supervision of the coalition’s Office of Reconstruction and Humanitarian Assistance (ORHA). Civilian engineer contractors were unable to respond to the demands and military engineer resources were diverted to immediate civil requirements. These requirements involved three critical missions: “providing facilities for the new Iraqi army, bedding down and constructing operational infrastructure for coalition forces, and destroying captured enemy ammunition” (Martin 2003, 7).

The operations of the 8th Engineer Battalion, 1st Cavalry Division from March 2004 to March 2005 are illustrated in the April-June 2005 edition of *Engineer Magazine*. The article discussing the unit’s operations is, “Rebuilding Baghdad: An Engineer Battalion’s Contribution”, written by LTC Bryan Dosa, MAJ Brian Davis, and CPT Brad Morgan, the battalion commander, operations officer, and construction officer respectively, of the 8th Engineer Battalion, 1st Cavalry Division. The unit’s primary mission was to rebuild the infrastructure and restore essential services in the two districts covered by its brigade combat team. During its deployment, the battalion completed more than \$15 million in projects and turned over another \$35 million of ongoing work to the 3rd Infantry Division.

MAJ Keith Dotts, the chief of operations of the 420th Engineer Brigade, wrote an article in the April-June 2005 issue of *Engineer Magazine* titled, “The 420th Engineer Brigade: Builders in Battle”, defining the purpose and mission of the 420th. The mission of the 420th was to provide command and control of theater engineer forces under the Multinational Corps-Iraq, in support of post-conflict reconstruction. The 420th was responsible for the operational control of all assigned engineer regiment units. Units that made up the 420th consisted of: mechanized; combat heavy construction; corps wheeled; topographic; multi-role bridge; construction support equipment (CSE), asphalt, paving, and rock crushing; facility engineer teams; US Army Corps of Engineers teams; and design and management teams. The brigade units also included US Marine bridge companies, prime power detachments, firefighting teams, well-drilling detachments, and other separate engineer companies.

The brigade executed a wide variety of missions that included: road construction; bridge emplacement; well emplacement; construction of force protection facilities, base camp facilities, schools, clinics, and airfields; enemy cache destruction; dive team recovery operations; and training of the Iraqi National Guard.

Another article from the April-June 2005 issue of *Engineer Magazine* provides additional insight into the various types of missions conducted by combat engineer battalions during OIF. The article, “The 44th Engineer Battalion Deploys Again”, written by 2LTs Patrick Anderson and Jennifer Sanford-Hayes, the construction officer and chemical officer of the 2nd Infantry Division Engineer Brigade, describes the unit’s train-up, deployment, and missions conducted while in theater. The unit conducted a wide variety of missions that included: managing, maintaining, and repairing facilities in

forward operating bases; performing enemy cache searches; route clearance; IED searches and neutralization; building barriers to protect local government facilities; supporting infantry task forces with engineer support and demolition missions; and performing traditional infantry-type tasks. The battalion also supported the Iraqi elections by constructing fortifications around polling centers and providing security on the day of elections. The battalion was also instrumental in training various Iraqi Security Forces.

Jim Garamone, a member of American Forces Press Service, explains how the 1088th Engineer Battalion, 256th Brigade Combat Team (BCT) (Louisiana National Guard) had the mission of improving electrical, water, sewage, and medical services to hundreds of thousands of Iraqis in their area of operations west of Baghdad in his article, "US Engineers Gaining Iraqi Confidence." The 1088th was responsible for more than \$11 million in humanitarian aid projects throughout the area, the largest project consisting of a nine-kilometer pipeline that brings clean drinking water to Suba al Bor (Garamone 2005). The unit worked on the project in conjunction with local Iraqi laborers while Iraqi engineers at Baghdad University performed quality control services and served as consultants on the project. Other projects conducted by the 1088th consisted of restoring electrical power, refurbishing schools, and the construction of an addition on a local medical clinic.

The preceding articles represent a sampling of the different missions and tasks that engineers conducted during OIF. The majority of the information regarding the missions conducted by engineers is obtained from articles or papers written by soldiers who served in those units and from AARs.

After-Action Reviews, Observations, and Lessons Learned

The unit AARs, observations, and lessons learned from OIF illustrate the problems and solutions that the combat engineer battalions faced as they conducted stability and reconstruction operations. The *3rd Infantry Division After-Action Review* provides insight into problems and solutions experienced by the engineer brigade and its combat engineer battalions during its operations from 2003 to 2004. The problems experienced were often caused by a lack of training in a particular area or a lack of resources required to execute a mission effectively.

The *Initial Impressions Report, Stability Operations, Support Operations-OIF* published in May 2004 by the Center for Army Lessons Learned provides observations of civil-military and engineer operations in Iraq from 2 February 03 to 3 March 04 at the brigade level and below. This report describes the problems faced by the 4th Infantry Division as they executed a variety of diverse missions. The report provides specific observations in the areas of civil-military projects, contracting, explosive ordnance disposal (EOD), reconnaissance, military operations in urban terrain (MOUT), and the staff capability required for stability and reconstruction operations.

The *Special Inspector General for Iraq Reconstruction Report to Congress* from October 2005 illustrates the critical issues confronting the reconstruction program. The reconstruction gap, sustainment, reliable cost-to-complete estimates, integrated information systems, direct contracting, coordinated program leadership, and anticorruption are such issues.

The various unit AARs, lessons learned, and observations provide insight into the problems and conditions that are ongoing for engineer units in Iraq. The Center for

Engineer Lessons Learned also provides multiple engineer after-action reviews and lessons learned that provide depth and perspective.

The literature listed in chapter 2 describes stability and reconstruction operations, provides a foundation for engineer doctrine in support of stability and reconstruction operations, illustrates the variety and multitude of missions combat engineers conducted in OIF, and provides insights and perspectives on lessons learned and observations. Chapter 3 will describe the methodology the thesis will use to answer the primary research question.

CHAPTER 3

RESEARCH METHODOLOGY

The Army used to have all the time in the world and no money; now we've got all the money and no time. (FM 1 2005a, 1-9)

General George C. Marshall

A Qualitative Approach

The purpose of this chapter is to describe the methodology this thesis will use to answer the primary question, were the combat engineer battalions deployed during OIF properly organized to conduct stability and reconstruction operations? This thesis is a case study of missions conducted by combat engineer battalions in support of stability and reconstruction operations during OIF. The thesis will describe the organization of a combat engineer battalion and any organizational problems and successes faced by combat engineer battalions as they executed stability and reconstruction operations. The thesis will descriptively compare the organizational problems and successes of various combat engineer battalions based on the requirements in OIF to determine any strengths or shortfalls in the organizational structure. It will then provide organizational recommendations for the future development of combat engineer battalions.

A Five-Step Research Methodology

The qualitative research method of this thesis has five steps.

1. Define and describe stability and reconstruction operations and the current engineer doctrine that supports stability and reconstruction operations.

2. Describe the combat engineer battalion organization in OIF during the time period of May 2003 to December 2005.
3. Outline the requirements of combat engineer battalions in support of stability and reconstruction operations in OIF.
4. Identify and describe any problems combat engineer battalions faced in OIF and how they developed solutions for those problems.
5. Compare the solutions by the different combat engineer battalions to determine shortfalls.

The following paragraphs will describe in detail the various steps of the research methodology.

Step 1: Define Stability and Reconstruction Operations and Engineer Doctrine

Chapter 2, “Literature Review” provides the doctrinal support to the primary research question. FM 1, *The Army*, defines stability and reconstruction operations as operations that “sustain and exploit security and control over areas, populations, and resources. They employ military capabilities to reconstruct or establish services and support civilian agencies. Stability and reconstruction operations involve both coercive and cooperative actions and may occur before, during, and after offensive and defensive operations; however, they also occur separately, usually at the lower end of the range of military operations. Stability and reconstruction operations lead to an environment in which, in cooperation with a legitimate government, the other instruments of national power can predominate” (FM 1 2005a, 3-7). Although other publications provide definitions for stability and reconstruction operations; the definition in FM 1 is used for this thesis.

Army forces conduct stability operations in a dynamic environment. Like offensive operations, stability operations are typically directed against an organized enemy. However, the enemy in this case study does not normally employ tactical formations to combat friendly forces and operates in a nonlinear and noncontiguous area of operations. The enemy tries to attrit friendly forces by using a variety of methods to include information operations, guerilla tactics, terrorism, and other insurgent activities aimed at military, police, civilian, and international targets. Combating these activities requires a large amount of time and manpower from friendly forces.

Determining key terrain and the troops and support available for stability operations requires additional factors be analyzed compared to traditional offensive and defensive operations. Key terrain is based more on political and social considerations than physical features of the landscape. The troops assigned or available to commanders include HN police units, contracted interpreters and laborers, and multinational forces. The level of integration and cohesion of a force composed of diverse assets is a key consideration for mission success (FM 3-0 2001, 9-5).

The goals of stability operations are not achievable in the short-term. Success requires perseverance and long-term commitment. The achievement of these goals may take years; however, daily operations require rapid responses to changing conditions based on unanticipated local conflict between competing groups. Civil considerations are extremely important and the civil population, HN government, NGOs, and international organizations all play a critical part in the success or failure of the mission.

Stability operations are complex and place great demands on small units. Small unit leaders are required to develop interpersonal skills. These skills include cultural

awareness, negotiating techniques, and language training. Soldiers and units at every level must be flexible and adaptive. Stability operations require leaders with the mental and physical agility to shift from noncombat to combat operations and back again (FM 3-0 2001, 9-5).

FM 3-07, *Stability Operations and Support Operations*, defines stability and support operations and provides the analytical tools needed to evaluate a stability operation or a support operation.

JP 3-34, *Engineer Doctrine for Joint Operations*, describes the capabilities the Engineer Regiment can provide to the Joint Force Commander. FM 3-34, *Engineer Operations*, defines the roles of engineers, lists the Engineer Regiment's mission essential tasks, and describes the engineer support to stability and support operations. FM 5-104, *General Engineering*, provides a doctrinal basis for planning and execution of general engineering in the Theater of Operations.

Step 2: Describe the Combat Engineer Battalion Organization

FM 3-34, *Engineer Operations*, describes the doctrinal organization of a combat engineer battalion that provides combat and general engineering capabilities to the maneuver commander during offensive, defensive, and stability and reconstruction operations. This description is provided in chapter 2, "Literature Review," and represents the organization of the combat engineer battalions that participated in this case study.

Step 3: Requirements of Combat Engineer Battalions in Stability and Reconstruction Operations in OIF

This thesis relied on primary sources for this step of the research methodology. Various Army divisions' AARs discussed the various missions and requirements of

combat engineer battalions in OIF. Numerous articles, from the Army's *Engineer Magazine*, written by officers from various engineer units also provided insight into the various requirements placed upon combat engineer battalions. This provides the thesis with requirements of combat engineer battalions based on experience in Iraq.

Doctrinal publications, to include FM 3-07, *Stability Operations and Support Operations*, and FM 3-34, *Engineer Operations* outline the missions and requirements of combat engineer battalions in stability and reconstruction operations based on doctrine.

Step 4: Identify Combat Engineer Battalion Problems and Solutions

To identify the problems and solutions faced by the combat engineer battalions, this thesis will rely on unit AARs, lessons learned and observations collected by the Center for Army Lessons Learned and the Center for Engineer Lessons Learned, as well as articles published in various military publications. Chapter 4, "Analysis," will group these identified problems into six subordinate categories: (1) Capabilities, (2) Priority of Support, (3) Command and Control, (4) Training, (5) Host Nation Support, and (6) Contracting. These categories were developed from the eight secondary research questions explained in chapter 1. The succeeding paragraphs will define these six terms for the purposes of this thesis.

The *American Heritage Dictionary* defines capability as, "the capacity to be used, treated, or developed for a specific purpose" (Houghton Mifflin Company 1985, 236). A capability could take the form of additional equipment, training, vehicles, education, or personnel with the appropriate skill set. To determine a capability problem emphasis is placed on the doctrinal combat engineering capabilities described in Chapter 2, "Literature Review." The question is: Do combat engineer battalions have the doctrinally

appropriate capabilities to fulfill mission requirements for stability and reconstruction operations? Combat engineer battalions that do not have the doctrinally appropriate capabilities to fulfill mission requirements have a capabilities problem.

FM 1-02, *Operational Terms and Graphics*, defines priority of support as priorities set by the commander in his concept of operations and during execution to ensure combat support and combat service support are provided to subordinate elements in accordance with their relative importance to accomplishing the mission (2004a, 1-150). Mission prioritization is a problem when mission requirements exceed the available capabilities.

The definition of command and control is “the exercise of authority and direction by a properly designated commander over assigned and attached forces in the accomplishment of the mission. C2 functions are performed through an arrangement of personnel, equipment, communications, facilities, and procedures employed by a commander in planning, directing, coordinating, and controlling forces and operations in the accomplishment of the mission” (FM 1-02 2004a, 1-37). This thesis focuses on the arrangement of personnel, equipment, and communications that facilitate effective command and control. Headquarters that do not have the doctrinally appropriate personnel, equipment, and communications for their assigned missions have a C2 problem.

Training is the instruction of personnel to increase their capacity to perform specific military functions and associated individual and collective tasks (FM 7-0 2002, Glossary-15). Training is the process that melds human and material resources into required capabilities (FM 7-0 2002, 1-1). The mission requirements of stability and

reconstruction operations require combat engineer battalions to be competent on a wide range of skill sets. Engineers that do not have the doctrinally appropriate tactical and technical competence for their assigned mission have a training problem.

Host Nation Support is defined by FM 1-02 as civil and/or military assistance rendered by a nation to foreign forces within its territory during peacetime, crises, emergencies, or war based on agreements mutually concluded between nations (FM 1-02 2004a, 1-94). The capabilities, strengths, and weaknesses of the HN should be assessed and integrated into operations as necessary. The amount of HN assistance can either help or hinder a unit's ability to conduct stability and reconstruction operations.

The *American Heritage Dictionary* defines contracting as “an agreement between two or more parties, especially one that is written and enforceable by law” (Houghton Mifflin Company 1985, 317). Contracting personnel are often used to fill a capability shortfall within the armed services or to augment military engineers when engineer requirements are too numerous.

Step 5: Compare Combat Engineer Battalion Solutions to Identify Shortfalls

Step 5 will compare the solutions of the different combat engineer battalions with regards to the problems identified in the areas of capability, priority of support, command and control, training, host nation support, and contracting. The comparisons in these six categories will produce critical analysis in the form of shortfalls. These shortfalls can then serve as criteria to provide recommendations for improvement in the organization of combat engineer battalions. These recommendations will form Chapter 5, “Conclusions and Recommendations.”

Chapter 3 describes the research methodology this thesis uses to answer the primary research question. Chapter 4, “Analysis,” will describe the outcomes and results of the research design.

CHAPTER 4

ANALYSIS

The Condition of the Army today can only be understood when one considers where we have been and where we are going. . . . The changes in the world have made us realize that to ultimately be successful in the Global War on Terror, we must transform our capabilities. We will not be ready and relevant in the 21st Century unless we become much more expeditionary, more joint, more rapidly deployable and adaptive, as well as enhance our capability to be successful across the entire range of military operations from major combat to the condition of stability. (FM 1 2005a, 4-1)

Dr. Francis J. Harvey, Secretary of the Army

At the announced cessation of major combat operations, combat engineer battalions moved from predominantly offensive operations to stability and reconstruction operations. The missions and tasks required of the combat engineer battalions changed as the transition from offensive operations to stability and reconstruction took place. This transition required flexibility and discipline from the units, which were called upon to secure neighborhoods and conduct humanitarian assistance operations. The initial focus was on establishing security for the civilian populace. Once a reasonable degree of security had been achieved, the mission priorities were focused on the reestablishment of services and utilities and in the removal of weapons caches and unexploded ordnance (UXOs). Multiple factors, such as HN support, contracting, and the fight to win the support of the local Iraqi populace, had significant influence on these operations.

This chapter will: (1) identify the problems that beset the combat engineer battalions, (2) describe how the engineer battalions overcame those problems, (3) compare the problems and solutions of the different combat engineer battalions and (4)

address any shortfalls in the combat engineer battalion organization identified from the comparison of the combat engineer battalions.

Identify Combat Engineer Battalion Problems and Solutions

Case Study 1: The 3rd Infantry Division Engineer Brigade and Associated Combat Engineer Battalions

Mission: As the focus shifted from offensive operations to stability and reconstruction operations during May 2003, the mission and priorities of the 3ID Engineer Brigade and its associated combat engineer battalions would also shift. The engineers were now located in Baghdad and the engineer focus was no longer on mobility operations, but on the restoration of essential services and reconnaissance missions.

Engineer Assets Available: The 3rd Infantry Division had three divisional combat engineer battalions that supported the maneuver brigades. These combat engineer battalions are the focus for this case study. Additionally, the brigade controlled one corps mechanized combat engineer battalion, one combat heavy battalion, four multi-role bridge companies, a combat support equipment company, a terrain detachment, and an explosive ordnance disposal company (3ID AAR 2004, 143). These additional assets help illustrate the multiple types of engineer assets required for stability and reconstruction operations.

Engineer Capability Problems: The engineer brigade and combat engineer battalions had several capabilities problems for the missions that were assigned after offensive operations. Over the course of the war, many components of the Iraqi national infrastructure, especially electricity, water, and sewage utilities, were damaged or destroyed. Much of the damage was a result of looters and vandals in the immediate

aftermath of the fall of the regime and all would have to be rebuilt (3ID AAR 2004, 156). The scope of general engineering repair required to restore the infrastructure of Baghdad was beyond the capabilities of the combat engineer battalions.

In addition to providing infrastructure repair, the engineers were assigned missions to fight as infantry. The engineer units had little training on the infantry tasks and doctrine did not provide for reorganization to fight as infantry.

The 3ID was only assigned one EOD company and this company quickly became over-tasked. The unexploded ammunition and ordnance removal and destruction requirements were so enormous that combat engineers were forced to work with EOD to dispose of this threat. Although combat engineers are trained in demolitions they are not specifically trained in rendering safe and destruction procedures for unexploded ordnance and this raises considerable safety concerns (3ID AAR 2004, 156).

The 3ID combat engineer battalions were assigned various types of reconnaissance missions to include obstacle reconnaissance, bridge reconnaissance and assessment, route reconnaissance, and infrastructure reconnaissance. The current combat engineer battalion organization does not provide the personnel and equipment for an assigned engineer reconnaissance team (ERT).

Engineer Capabilities Solutions: To execute the mission of restoring utilities in Baghdad the engineer brigade cooperated with Coalition Forces Land Component Command's Task Force (TF) Faijr. TF Faijr was charged with restoring the power, water, and sewage utilities nationwide. The engineer brigade and TF Faijr shared capabilities to complete the mission. The engineer brigade provided transportation, communications, topographic analysis, and reported the status and security of the various utilities. TF Faijr

corresponded with national intelligence and assisted with US government approval issues, funding, and coordination with OHRA (3ID AAR 2004, 157). The engineer brigade and subordinate combat engineer battalions received additional support from prime power experts to restore power. A facilities engineer detachment assisted with technical assessment, repair, and coordination in Baghdad (3ID AAR 2004, 157). Additionally, the combat engineer battalions received technical assistance through “reach back” video teleconferences with USACE technical experts in the U.S.

The combat engineer battalions created their own ERTs by utilizing excess HMMWVs to form the teams. The ERTs were used in Baghdad to perform reconnaissance on utilities in the city.

Engineer Priority of Support Problems: The priority of support problem was determining when and where to mass engineer assets. Multiple missions that included infrastructure repair, fighting as infantry, destroying UXOs, and conducting reconnaissance all vied for the limited engineer assets available.

Engineer Priority of Support Solutions: The engineer brigade directed the combat engineer battalions to begin engineer reconnaissance in zone to identify, assess, and repair, if able, Baghdad’s utilities. The critical infrastructure nodes were assessed by various elements from the battalions. At the engineer brigade this information was exchanged at daily engineer fusion cell meetings, here the brigade decided on allocation of priorities and resources (3ID AAR 2004, 156).

Engineer Command and Control Problems: As the battalions operated over a large battlespace, often over 300 kilometers apart, command, control, and communications proved to be a difficult task. The various battalions and their subordinate companies were

hundreds of kilometers from their higher headquarters. There were limited long-range high-frequency radios and they were often non-mission capable (3ID AAR 2004, 160). The only Force XXI Battle Command, Brigade and Below (FBCB2) system was in the engineer brigade commander's HMMWV. FBCB2 is a digital, Battle Command Information system that provides on-the-move, real-time and near-real-time battle command information to leaders and Soldiers. The majority of the engineer reports had to be passed through the maneuver brigades as the communications systems throughout the engineer brigade were insufficient for the distance. Single Channel Ground and Airborne Radio System (SINCGARS) FM radios were used extensively for battalion and below communications, but rarely could the engineer brigade talk to all of its subordinate units via FM due to the long range. Also, the engineer brigade only had one tactical satellite (TACSAT) radio.

Engineer Command and Control Solutions: The engineer brigade and TF Faijr established a combined engineer operations center at Baghdad South, a key city power plant. For long-range communications, several iridium phones were used for commander-to-commander discussions.

Engineer Training Problems: Prior to combat operations, the primary training of the engineer battalions focused on mobility tasks to include route marking and signing, traffic control, minefield reduction, and river crossing (3ID AAR 2004, 151). General engineering and infantry tasks, to include military operations in urban terrain (MOUT), were not heavily trained on. This was due to the engineer brigade's focus on "establishing tactics, techniques and procedures to implement the emerging engineer doctrine of assured mobility that is designed to assure maneuver commanders freedom of

maneuver by predicting, preventing, detecting, or neutralizing obstacles to mobility on the battlefield” (3ID AAR 2004, 150). This training was conducted prior to the deployment to Iraq.

Engineer Training Solutions: To assist the combat engineer battalions with conducting their infrastructure assessments a simple methodology was developed during the execution of operations by the engineer brigade. This assessment checklist was used by the subordinate platoons and companies to provide feedback to the engineer brigade on the status of the various utilities. These assessments assisted with the prioritization of assets and efforts.

Host Nation Support Problems: When 3ID entered Baghdad and toppled Hussein’s government much of the governmental support systems were destroyed. The HN government essentially ceased to exist until the US military could assist in the establishment of a new one. The lack of functioning government impeded the ability of the HN to conduct infrastructure assessment and repair.

Host Nation Support Solutions: The engineer brigade located and utilized local Iraqi electrical, water, and sewage authorities to repair and restore damaged utilities.

Case Study 2: The 4th Infantry Division Combat Engineer Battalions

Mission: The 4th Infantry Division deployed to Iraq in February-March 2003 and conducted operations that included high-intensity combat, counterinsurgency operations, and civil-military operations. The division’s plan was to conduct aggressive offensive operations to defeat non-compliant enemy forces and to conduct civil-military operations to restore Iraq’s ability to govern and secure itself. The division’s campaign plan focused

on conducting operations in the areas of military, governance, infrastructure, and economy.

The division worked to rebuild the economy and infrastructure of Iraq. Three provinces within the division area of operations established provincial, district, local and city governments. Over \$100 million was spent funding nearly 3,000 projects improving water, sanitation, electricity, and the overall quality of life for the Iraqi people.

Engineer Assets Available: The 4th Infantry Division had three divisional combat engineer battalions that supported the three maneuver brigades.

Engineer Capabilities Problems: The combat engineers were tasked with multiple missions that included base infrastructure construction, cordon and search operations, convoy security operations, general site patrolling, and EOD missions.

When tasked to conduct base infrastructure construction the engineers lacked the class IV materials needed for construction, which were limited throughout theater. When materials were available, the combat engineer battalions had brought the bare minimum of equipment to complete the base infrastructure construction and found that leasing the necessary equipment in country was difficult (Initial Impressions Report, Stability Operations, Support Operations-OIF 2004c, 48). The lack of front-end loaders, cranes, small emplacement excavators, and bobcat-type loaders delayed operations.

Similar to the 3ID combat engineer battalions the combat engineer battalions of the 4ID did not have dedicated engineer reconnaissance resources and lacked vertical, horizontal, and utility capabilities. Multiple engineer operations over large areas often required combat engineer battalions to operate with all their assigned subordinate elements or as a battalion task force. When the battalions conducted these types of

operations they found that they lacked key CSS assets that limited their ability for independent operations involving reconnaissance, infrastructure repair, or fighting as infantry.

Doctrinally, there are not any ERTs assigned to combat engineer battalions. Doctrine states that the line squads of the engineer companies can be called upon to do this task. The squads did train on this mission as a secondary task prior to deployment, but the reconnaissance tasks did not receive priority and the squads often lacked the equipment to execute this mission effectively.

As millions of tons of captured ammunition were found around the country, the combat engineers were required to assist the overwhelmed EOD detachments. The combat engineers were selected for this task because of their training in explosives and demolitions. However, destroying large ammunition caches was not part of their training prior to deployment.

Divisions normally required a divisional engineer headquarters and engineer group headquarters to support engineer C2 requirements. The headquarters lacked construction design and management sections which reduced the ability to C2 the construction effort. In addition, it also lacked an S5 (civil-military operations) section to leverage local resources and integrate engineer efforts with civil affairs efforts and other humanitarian efforts. Due to the austere administration and logistics section within the headquarters, its ability to provide effective, responsive support to supported elements is inhibited (Initial Impressions Report, Stability Operations, Support Operations-OIF 2004c, 51).

Engineer Capabilities Solutions: Many combat engineer battalions formed their own highly mobile, specialized engineer reconnaissance force by using borrowed equipment and Soldiers reassigned from within the battalion to solve the engineer reconnaissance capability problem. This reorganization took place in theater after deployment. Engineer battalion commanders completed missions for which they had not been trained, acquired assets in the AO to achieve these missions, and dealt with a counterinsurgency operation that required additional intelligence that only reconnaissance could provide (Initial Impressions Report, Stability Operations, Support Operations-OIF 2004c, 52).

The ERTs brought to the battalion the ability to operate independently. The ERTs provided intelligence for cordon and search operations, located and identified captured enemy ammunition and UXOs, and provided security for convoy movements.

Engineer Priority of Support Problems: The primary priority of support problem was how to achieve the best balance between civil-military operations and combat operations with the engineer assets available. The broad scope of missions, tempo of operations, and the size of the battlespace influenced the support requirements.

Engineer Priority of Support Solutions: Priorities were assigned based on the commander's assessment of the situation and recommendations from subordinates. Factors that were considered included how the Iraqi populace was affected and how each operation changed the security and stability of the area.

Engineer Command and Control Problems: The platoons and squads within the combat engineer battalions lacked the ability to communicate with one another during tactical operations. Squad leaders needed immediate contact with squad members during

cordon and search operations. Convoy commanders had to be able to talk to all of their vehicles to coordinate a response to attack. Patrol leaders required immediate information to respond to concerns caused by civilian traffic flow in their AO and movement of civilian personnel. The units lacked the individual communications equipment that was essential for tactical movement and movement to contact operations (Initial Impressions Report, Stability Operations, Support Operations-OIF 2004c, 49).

Engineer Command and Control Solutions: To solve the problem of the lack of individual communications equipment, the engineer units bought walkie-talkies. However, these walkie-talkies lacked the ability to transmit in a secure mode.

Engineer Training Problems: Since engineers were often available they were chosen to plan and execute infantry-type missions. The biggest concern faced by engineer commanders was the ability of their units to fight in an urban environment. Emphasis was not placed on training for these missions during home station training because engineers were usually involved in breaching operations and general engineering missions. Training for fighting in an urban environment was secondary or even tertiary to their primary missions. The limited amount of training time and the focus on other METL tasks often prevented training in this area. The engineer units also lacked the proper weapons, laser sights, and night vision devices necessary for success in an urban environment.

The missions assigned to the combat engineer battalion commanders required extensive reconnaissance to assist in the planning of operations. The ERTs were the battalion commanders' tool to provide the intelligence. Without the ERTs, the engineer battalion commanders had to rely on other intelligence sources located within the

brigade. The missions the ERTs were called on to conduct fell into four categories: technical reconnaissance, tactical reconnaissance, force protection missions, and raids and cordon operations. The ERTs were trained on the first two categories, but not on the last two.

Engineer Training Solutions: Training for urban combat was completed during abbreviated training sessions at the mobilization stations prior to deployment. The engineer units also received training from the military police to assist them with fighting in an urban environment in theater prior to executing missions.

To deal with the massive amounts of ammunition that needed to be destroyed the combat engineer battalions conducted “on-the-job” training using advice and recommendations from EOD. The engineers determined what type and how much explosive should be used to detonate captured ammunition. Secondly, they determined what type and how much explosive should be used to detonate a missile versus an artillery round and whether or not sub-munitions would be scattered when a missile is detonated.

Local Contracting Problems: The combat engineer battalions found that many of the civilians were too willing to be hired to help. It often appeared that anyone who wanted to be a contractor rolled in his wheelbarrows and made an attempt to go to work. High-level community figures were eager to help assign work to contractors who turned out in many cases to be their family members. These firms had little or no construction experience.

Local Contracting Solutions: Commanders utilized Commander’s Emergency Relief Program (CERP) funds to complete local projects that would provide immediate

benefits to the communities. This program hired and paid Iraqi contractors and laborers to complete civil works projects that had an immediate positive influence on the health and well-being of the community. The battalions also utilized the Iraqi forward engineer support teams (I-FEST) located at the division level. The I-FEST coordinated work between the engineers and the Iraqi contractors. The use of knowledgeable interpreters was the key to finding quality firms for both design and construction.

US Contracting Problems: The constant turnover of contractor personnel due to stateside rotation for rest and relaxation prevented the ability to effectively maintain continuity of operations. The process of submitting and executing a valid contract purchase was too long considering the division operated in an austere environment and depended on the local economy to provide specific goods and services (4ID Lessons Learned Executive Summary 2004, 50). The quality of service provided by local contractors was lacking and there was a shortage of contracting officer representatives to properly oversee the performance of contracting terms.

Throughout OIF, contractors selected for construction projects repeatedly failed to meet construction standards and delivery dates. Written contracts that defined the scope of work, construction standards, and delivery dates were not used because contract specialists were not available. Engineer staffs were not prepared to take over infrastructure design and build missions because their focus remained in the warfighting area. In addition, commanders did not have access to personnel with contract writing ability.

US Contracting Solutions: Contractors who did a poor job were eliminated from the contractor pool. To provide quality control and quality assurance on the construction

projects, the I-FEST had the mission of providing construction inspections. This was accomplished by hiring quality engineering firms to conduct the inspections.

Case Study 3: The 8th Combat Engineer Battalion, 1st Cavalry Division

Mission: The 8th Engineer Battalion deployed to Baghdad for OIF from March 2004 to March 2005. Although the unit performed a wide range of combat engineer and security tasks, its primary mission was to rebuild the infrastructure and restore essential services in the two districts of the BCT's area of operations (Dosa, Davis, and Morgan 2005, 11).

Engineer Assets Available: The 8th Engineer Battalion had its organic combat engineer companies. Due to a lack of information on the other combat engineer battalions within the 1st Cavalry Division this particular case study will only address the 8th Combat Engineer Battalion.

Engineer Capabilities Problems: The engineer battalion lacked the technical expertise and resources to execute the various infrastructure projects without assistance from local Iraqi contractors.

Engineer Capabilities Solutions: The battalion worked with the local Iraqis to help rebuild the infrastructure and utilized local labor to execute the projects. The infrastructure projects created numerous local employment opportunities, stimulated the economy, and reduced the ability of anti-Iraqi forces to recruit.

Engineer Command and Control Problems: The battalion needed to develop a system that could coordinate, manage, and supervise the various infrastructure projects.

Engineer Command and Control Solutions: The battalion established the Infrastructure Coordination Element (ICE) from within its S3 (operations) section (see

figure 3) that was composed of four engineer captains. Each captain was responsible for a specific area of sewer, water, electricity, or trash. The ICE also had a noncommissioned officer in charge and a computer operations specialist. The battalion commander and his personal security detachment conducted most of the coordination with city and district leaders. The battalion commander communicated directly with the district councils in weekly meetings and received input on the required work and priority areas.

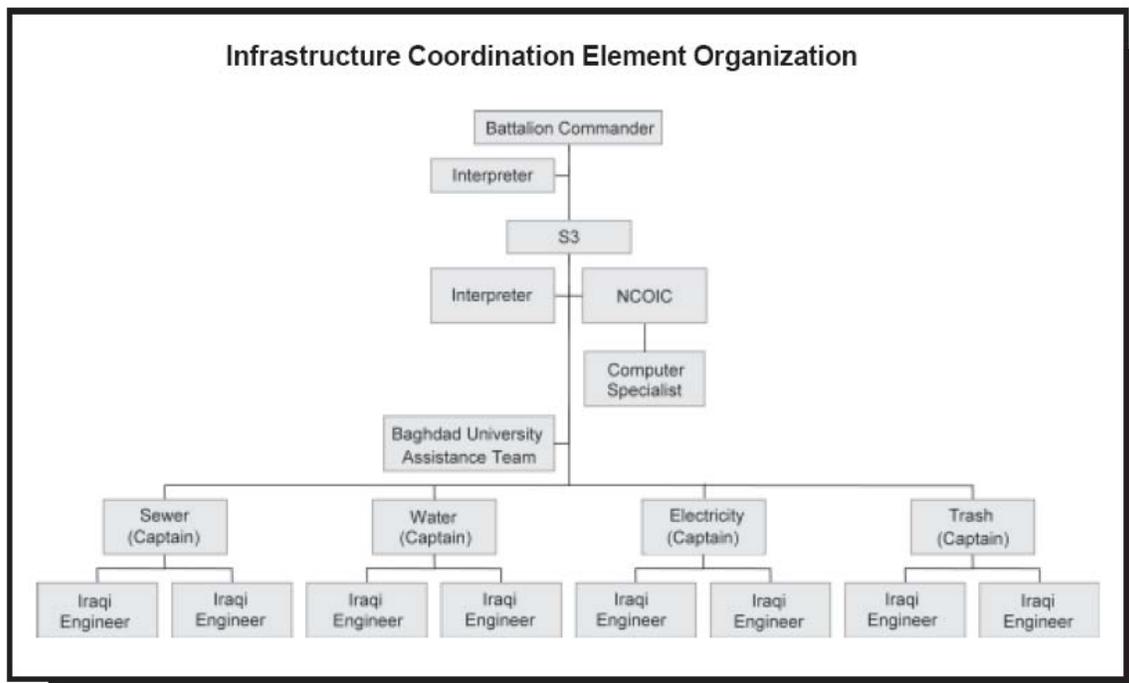


Figure 3. Infrastructure Coordination Element Organization

Source: Dosa, Davis, and Morgan, “Rebuilding Baghdad: An Engineer Battalion’s Contribution,” *Engineer Magazine* (Fort Leonard Wood, MO), April-June 2005, 12.

Engineer Priority of Support Problems: Multiple parties competed for the funding and assistance the battalion was providing for reconstruction. The battalion had to ensure

that the contracts awarded would not promote political or personal gain (Dosa, Davis, and Morgan 2005, 12).

Engineer Priority of Support Solutions: The ICE officers worked with the Iraqi engineers and local leaders to establish priorities and organize efforts. Areas that posed the biggest security issues were assigned the higher priority for projects. Often the district and city engineers identified the project areas.

Engineer Training Problems: Soldiers of the battalion did not have the technical engineering training for the infrastructure repair.

Engineer Training Solutions: To address the lack of technical engineering training, the battalion employed a staff of ten local Iraqi engineers and interpreters. The Iraqi engineers and interpreters were able to provide the battalion with the technical expertise required for the infrastructure repair projects.

Host Nation Support Problems: Baghdad's city engineers and officials knew the infrastructure problems and solutions, but lacked the financial resources to fix them (Dosa, Davis, and Morgan 2005, 11). Baghdad had an organized system of public works. Each of the nine city districts had a public works director general who had sewer, water, and solid waste superintendents and a staff. In addition, there were established departments for sewer, water, electrical, and trash. Although most of the departments were staffed with capable engineers and staff, they sometimes had difficulty making significant progress on their own (Dosa, Davis, and Morgan 2005, 12).

The local Iraqi leaders of the city government in Baghdad did not have the resources to conduct routine maintenance and repairs of essential services. They also did

not have the resources to start large improvement projects (Dosa, Davis, and Morgan 2005, 12).

Host Nation Support Solutions: To assist the local Iraqi leaders with reconstruction, the battalion was able to obtain the necessary funding from a variety of sources, including CERP funds, appropriated funds, and donated international funds (Dosa, Davis, and Morgan 2005, 12).

Contracting Problems: Some contractors lacked the skills and resources required to execute construction projects to the proper standard.

Contracting Solutions: Reconstruction projects were completed by Iraqi contractors who employed Iraqi workers. The ICE held regular bidding conferences to announce and distribute bid packages for upcoming work. The battalion used simple and standardized packets, in both Arabic and English, to solicit clear and accurate bid proposals. After receiving the bids, the battalion formed selection committees to choose the best contractor for the job. The committees consisted of a city engineer, a district engineer, a local council member, and an officer from the unit that operated in that area. Selections were based on the contractor's previous experience and his local labor and security plans. Selection was not based on the lowest bidder (Dosa, Davis, and Morgan 2005, 13).

Quality control was an Iraqi responsibility. A team consisting of engineers appointed by the city and district was responsible for the day-to-day project oversight. The engineer battalion leadership was responsible for quality assurance. Reports from the contractors and the quality control teams were submitted at weekly project coordination

meetings. These meetings provided much of the coordination for local labor, security, and communication with the local residents (Dosa, Davis, and Morgan 2005, 13).

Combat Engineer Battalion Problems and Solutions Comparison

The previous case studies identified a common pattern of problems and solutions for the combat engineer battalions. The following section of the thesis will compare the different combat engineer battalion problems and solutions in the areas of capability, priority of support, command and control, training, host nation support, and contracting.

Capabilities

The primary capabilities problem of the combat engineer battalions was that their capabilities were organized toward combat operations and not stability and reconstruction operations. The restoration of civil infrastructure, the destruction of ammunition caches, and fighting as infantry were new missions for the battalions. In the past, the battalions focused primarily on mobility operations. The limited amount of general engineering and EOD units in theater placed the burden of restoring the infrastructure and conducting EOD missions on the combat engineer battalions. The multiple security missions throughout the AO also required the engineer battalions to fight as infantry.

To face these problems the various combat engineer units were able to develop innovative reorganizations to meet the new requirements of the stability and reconstruction missions. Units were able to tailor force packages to meet the new requirements. Innovative leaders and Soldiers were essential to developing the new capabilities required to successfully complete the missions.

Priority of Support

With the lack of capabilities for stability and reconstruction operations and the goal to achieve the support of the local populace, priority of support became difficult. Commanders and staff planners had to decide what limited engineer resources to allocate for infrastructure repair, reconnaissance, fighting as infantry, and destroying unexploded ordnance. The battalion then had to decide which missions should receive priority.

The engineer assets were prioritized to missions that immediately improved security and stability. The influence on the Iraqi populace and recommendations from local leaders influenced the prioritization process. Engineer commanders also assigned their assets based on their capabilities and mission requirements.

Command and Control

Combat engineer battalion command and control structures were designed for offensive operations and not stability and reconstruction operations. Often the battalions had to plan and execute combat operations and civil-military operations simultaneously. The communications systems available in the combat engineer battalions were inadequate and hindered the command and control of the various operations.

The engineer units reorganized their headquarters elements in ways that would provide them the best command and control for the new missions they had to execute. To enhance their ability to communicate, units bought commercial communications devices or borrowed equipment from other forces.

Training

Premobilization training of the combat engineer battalions focused on offensive mobility tasks and not stability and reconstruction tasks. As operations shifted from offensive combat operations to stability and reconstruction operations, the combat engineer battalions found themselves executing a wide variety of tasks for which they had not trained previously.

To offset the training deficiency, the various units relied on expertise provided them from I-FEST teams, military police, EOD, and infantry units. The engineers relied on their versatility to adapt to changing circumstances and meet new mission requirements. The experience and knowledge gained from on-the-job training became invaluable.

Host Nation Support

The ability of the HN to provide support was limited at best. The fall of Hussein's government destroyed the governmental support systems that were previously in place. The HN government needed time to re-establish itself and to create new systems that could provide support.

The engineer units were able to establish new systems to work with the local Iraqi people to maximize the host nation's ability to provide resources and execute missions.

Contracting

The primary difficulty in this area was finding contractors that could provide a quality product in a reasonable amount of time. Contracting officers were also limited and in high demand due to the vast number of projects.

The engineer units received assistance from I-FEST teams to assist with the contracting problems. Also, as time passed quality Iraqi construction firms emerged that met the required construction standards. Iraqi engineers also assisted with quality assurance and control.

Combat Engineer Battalion Shortfalls

The purpose of this section is to identify the shortfalls that the three previous case studies illustrated. These shortfalls serve as criteria to provide recommendations for improvement in the organization of combat engineer battalions.

Infrastructure Repair

The combat engineer battalion headquarters lacked construction design and management sections which reduced their ability to command and control construction operations. In addition, the battalion lacked an S5 (civil-military operations) section that could leverage local resources and integrate engineer efforts with civil affairs efforts and other humanitarian efforts. Because of the limited administrative-logistics section within the headquarters, the battalion's ability to provide effective and responsive support was limited. The combat engineer battalions also lacked the skilled personnel to meet the mission requirements of infrastructure repair.

Command and Control

Combat engineer battalions lacked the required long-range communication systems to conduct dispersed stability and reconstruction operations. Not all vehicles were authorized radio systems, limited TACSAT radios were available, and digital

systems such as FBCB2 were limited. At the squad and platoon level, combat engineer units lacked the ability to communicate with one another during operations.

Explosive Ordnance Disposal

Throughout the various operations explosive ordnance in the form of mines, weapons and ammunition caches, improvised explosive devices (IEDs), and UXOs impeded mobility and placed soldiers at risk. Due to the limited EOD force, the responsiveness to handle these missions was often slow and engineers were asked to assist in these missions.

Despite a lack of proper training and equipment combat engineers handled caches, disposed of UXOs, and destroyed IEDs. Engineers executed cache destruction with only limited on- the- job training. They based their actions on past experience, trial and error, and common sense. Although the engineers completed the missions, the lack of habitual training hampered operations by increasing the time required to conduct disposal missions, placed soldiers at risk, and took them away from other missions.

Engineer Reconnaissance Team

The ERT is not authorized by the Table of Organization and Equipment, but is being employed during operations without the dedicated personnel and vehicle assets. Equipment and vehicles were reorganized internally and at the discretion of the commander. Some solutions included using the S3 or chaplain's vehicle.

ERTs need specific training to be more effective. This includes topics such as obstacle reporting, bridge reconnaissance and assessment, how to use laser range finders,

task force scout integration, obstacle marking, route reconnaissance, and utilities reconnaissance.

Fighting as Infantry

Combat engineers do not have the doctrine, training, personnel and equipment to support MOUT operations. Engineers in a MOUT environment habitually provide support to infantry and armor units. Engineers were called upon to conduct breaching operations which required basic urban infantry skills to get to the objective.

When engineer companies were tasked to conduct MOUT operations independently of other maneuver forces the task was even more difficult. Engineer Sapper Platoons only have twelve dismounted soldiers available to conduct operations; this is hardly an effective number of soldiers to effectively and efficiently conduct MOUT operations.

Combat engineers train very little on MOUT operations. Reflexive fire training and building assault training is generally a part of a unit's METL, but is often not conducted due to time constraints and prioritization placed on other tasks. When ordered to conduct MOUT, units must rely upon the knowledge of soldiers who have had MOUT training in a previous assignment. MOUT also requires special equipment that engineers generally do not have. Units with a MOUT mission must borrow equipment from infantry units or purchase them. Receiving the equipment at the last minute impairs the unit's ability to train on it.

Contracting

Commanders lacked the skilled personnel to professionally define the projects they were asked to do. There were not enough contract construction agents and many were unavailable for extended periods of time to assist with developing contracts. A contract agent was available at the division level only.

Chapter 4, "Analysis," identifies the combat engineer battalion problems and solutions with regards to stability and reconstruction operations. These problems and solutions are illustrated in the case studies of the 3rd Infantry Division, 4th Infantry Division, and the 1st Cavalry Division and their organic combat engineer battalions. It then compares the various units' problems and solutions to determine shortfalls in the combat engineer battalion organization. Chapter 5, "Conclusions and Recommendations," will present the implications of the outcomes and results described in chapter 4.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

We will not be effective and relevant in the 21st century unless we become much more agile but with the capacity for a long-term, sustained level of conflict. Being relevant means having a campaign-quality Army with joint expeditionary capability. It must be an Army not trained for a single event like a track athlete, but talented across a broad spectrum like a decathlete. (FM 1 2005a, 4-6)

General Peter J. Schoomaker
Chief of Staff of the Army

Introduction

The purpose of this chapter is to present the conclusions from the analysis conducted in chapter 4, present implications for the Future Engineer Force (FEF), provide recommendations for adjustment to the combat engineer battalion organization and for further research on the topic. Although the analysis indicates that the combat engineer battalions were successful in the areas of capabilities, priority of support, command and control, training, host nation support, and contracting with regards to the stability and reconstruction missions they conducted, it also shows that there is room for improvement.

Conclusions

The combat engineer battalions were not organized to conduct stability and reconstruction operations during Operation Iraqi Freedom (OIF). The combat engineer battalion organization was structured for traditional offensive and defensive combat operations. This organizational structure posed significant problems for the battalions as they transitioned to stability and reconstruction operations. The previous case studies

have shown that stability and reconstruction operations require units that have sufficient capabilities to enable them to perform in an environment of changing mission requirements. The inventiveness of the leaders and Soldiers allowed combat engineer battalions to overcome their organizational deficiencies to complete their missions. This inventiveness and adaptability was illustrated by the improvised solutions employed by the battalions to meet the problems imposed upon them during their operations.

Combat engineer battalions were often chosen to conduct a wide variety of missions due to the capabilities they could provide and their availability. Combat engineer battalions were organized and trained to provide mobility, countermobility, survivability, geospatial, and general engineering capabilities to the units that they supported. During the conduct of stability and reconstruction operations the battalions found that the additional capabilities of infrastructure repair, explosive ordnance disposal (EOD) operations, fighting as infantry, engineer reconnaissance, and contracting were required. The battalions initially lacked the organization and training to provide these capabilities. But through innovative and flexible leaders and Soldiers, the battalions were able to reorganize, obtain additional training in theater, and work with other organizations to provide the required capability. However, as units provide more and more capabilities they sacrifice some effectiveness in specific areas as they become broader.

Maximizing the capabilities of the host nation during stability and reconstruction operations is essential to success. Initially, the ability of Iraq to provide support was minimal. The regime removal caused the majority of the governmental systems to break down and new systems needed to be developed. The Commander's Emergency Relief Program (CERP) was instrumental in assisting the Iraqi government with vital

infrastructure projects. As time passed the governmental systems and the people of Iraq were able to provide increased support for the rebuilding of their nation. This support came in various forms including the establishment of the Iraqi Army and police forces and the ability to conduct infrastructure repair. The ability of the US military to work with the Iraqis provided for a more stable and secure environment, empowered the host nation (HN), built confidence in the Iraqi government, reduced support for insurgent activities, and provided capabilities that were lacking in US military forces.

Implications for the Future Engineer Force

As the Army transforms, the FEF will provide modular, scalable, and mission-tailored capabilities for the Army. The FEF units will be highly trained and organized for a particular skill set and capability. Narrowing the focus of training and organization provides a higher skill level on a particular capability, but impairs the unit's versatility and ability to provide multifunctional capabilities. If a wide variety of FEF units are deployed to fill the capabilities required, versatility may not be an issue. The current trend is to minimize the deployed force structure when possible and maximize the capabilities of the minimum units necessary. The previous case studies have shown that the nature and state of stability and reconstruction operations require units that can provide multifunctional capabilities. The FEF will not provide a unit that has multifunctional capabilities.

Another potential problem for the FEF is the lack of an engineer battalion headquarters and engineer battalion commander to provide support for the brigade combat teams (BCTs). The engineer companies are now part of the combined arms battalions and there is only a minimal engineer staff component at the BCT level. The

lack of an organic engineer battalion could impact the ability of a BCT to properly plan for and direct the engineer assets, understand the engineer capabilities available, and establish training priorities. The various case studies have demonstrated that a combat engineer battalion headquarters and staff are essential for success when conducting stability and reconstruction operations. These types of operations are engineer intensive and require a staff that has been trained to plan, coordinate, execute, and supervise these missions.

Recommendations for Adjustment to the Combat Engineer Battalion Organization

The following recommendations provide the combat engineer battalion organization with increased capabilities. The capability enhancement could take the form of additional equipment, training, education, or personnel with the appropriate skill set. It would be nice to have these additional capabilities organic to the unit organization, but this may not be feasible. Therefore, additional assistance could be received through augmentation from other organizations or via “reach back” to the US. These recommendations will provide suggestions that could prevent an organization from encountering a situation for which the unit is completely unprepared.

Infrastructure Repair

The combat engineer battalion requires personnel that are skilled in construction design and management. Additional slots should be added to the modified table of organization and equipment (MTOE) to provide the technical expertise necessary to manage utility repair. These slots should be added to the operations section of the battalion headquarters. Additional training could be added to the Engineer Officer’s Basic

and Captain's Career Courses covering infrastructure repair in detail. Officers and Soldiers could also take on-line courses to further their education in this area. Units should continue to take advantage of "reach back" technology to consult experts from the United States Army Corps of Engineers (USACE) and other agencies located in theater or in the United States.

The addition of a civil affairs officer position in the battalion headquarters operations section would also benefit the combat engineer battalion. This officer would provide the essential service of integrating the engineer projects with the local civilian leaders and populace. The officer could also assist with identifying critical requirements needed by local citizens, locating civil resources to support military operations, facilitating humanitarian assistance activities, and establishing and maintaining communication with civilian aid agencies and organizations. At a minimum a civil affairs officer should be located at the BCT headquarters that could provide assistance to the battalion. If a civil affairs officer cannot be added at the battalion level, the battalion could have an engineer officer receive training in civil affairs functions. This could take place through combined training with civil affairs units as part of predeployment training.

Command and Control

The combat engineer battalion MTOE should be adjusted to enhance the battalion's ability to communicate. Long range communications systems are needed to control engineer operations over extended distances. The battalions also require a greater allocation of radios so that each vehicle is provided one. In addition, digital systems such as Force XXI Battle Command, Brigade and Below (FBCB2) should, at a minimum, be fielded down to platoon level. The addition of these communications systems will

increase the battalion's ability to command and control its subordinate units. Each combat engineer battalion should be provided a tele-engineering kit. This kit allows engineers to take pictures and videos of engineer specific issues and send them back to USACE experts located in the United States for suggestions and recommendations to help fix problems. Finally, individual radio systems are required at the squad and platoon level to command and control dismounted operations.

Explosive Ordnance Disposal

The demolitions and explosives training that combat engineers receive make them the best alternative to conducting EOD missions when actual EOD units are unavailable. As engineers have taken on missions to assist EOD elements, the majority of the training for the engineers was on-the-job. Since improvised explosive devices (IEDs) are the weapon of choice for Iraqi insurgents, engineers will be called on to assist in EOD missions. Engineers will need EOD- type training added to the training schedule at various engineer specific schools (Engineer Officer's Basic and Career Courses, Individual Advanced Training, etc). Engineers and EOD detachments must work together and conduct joint training prior to deployment to enhance the ability of engineers to execute these missions.

As tactics, techniques, and procedures are developed for the various EOD missions, an electronic database or training or field manual should be developed covering the scope of the operations. The destruction of ammunition caches is one element that should be included in the manual. The manual should show illustrations of different rounds and the types of explosives needed to detonate them. The manual should also illustrate how the ammunition should be stacked and where the demolition charges

should be placed. How much and what type of explosive to be used to ensure complete elimination should also be included. A consolidation of demolition practices used by division artillery, EOD units, and combat engineers during OIF would help facilitate the development of this manual.

Engineer Reconnaissance Team

The equipment and resources required to support the engineer reconnaissance team (ERT) mission should be designated in the combat engineer battalion MTOE. Additional personnel are required to fill the ERT that do not take away from the limited number of combat engineers assigned to a combat engineer battalion. The ERT also requires additional equipment that includes HMMWVs, laser range finders, and crew-served weapons.

An independent reconnaissance team in a combat engineer battalion provides the battalion commander with flexibility in how he will accomplish his missions. The addition of this ERT will eliminate waiting time for reconnaissance assistance, improving efficiency for mission accomplishment. The ERT's training should focus on the areas of technical reconnaissance, tactical reconnaissance, force protection missions, and raids and cordon operations. The ERT's training should be integrated with the armored reconnaissance squadron of the BCT during squadron and brigade training exercises to facilitate team building and enhancement of the ERT's training level.

Fighting as Infantry

Now that combat engineers have taken on a greater role fighting as infantry, the resources and training for such infantry tasks is necessary to successfully execute these

missions. The combat engineer battalion MTOE should be adjusted to provide the proper amount of weapons, laser sights, and night vision devices. Also, many of the engineer vehicles lack crew-served weapon mounts and up-armor for vehicles. The ability for individual Soldiers to communicate with one another during tactical operations must be upgraded. Individual communications equipment that can operate in a secure and non-secure mode should also be added to the MTOE.

Training for combat in an urban environment must have a higher priority. Urban combat training should be added to the combat engineer battalion mission essential task list (METL) and incorporated into unit training plans. Some examples of training that could be implemented are squad tactics, cordon and search operations, and communication with air assets during patrolling operations. This training should be incorporated into combat training center rotations prior to deployment and rehearsed again upon arrival in theater.

US and Iraqi Contracting

Working with contractors was a relatively new experience for the combat engineer battalions in Iraq. The process was often difficult and time-consuming. The battalion staffs did not have the requisite training to efficiently and effectively draft and manage contracts with the Iraqis. Contracting agents located at the division level only added difficulty to the task. As the use of contractors becomes more prevalent in the operations that engineers conduct, it is necessary to assign contracting agents at lower levels. At a minimum, contracting agents should be located at the brigade level. A member of the battalion staff should attend a contracting course to receive a certification

in executing contracts. Other recommended areas of study are facilities repair and construction, base operations and maintenance, and logistics services.

Recommendations for Further Study

This thesis recommends the further study of: (1) stability and reconstruction operations, (2) the FEF transformation, (3) the role of coalition and joint partners, and (4) the integration of interagency capabilities.

This thesis dealt with the execution of stability and reconstruction operations after a regime change. The conditions for this particular operation were unique and may or may not be experienced in future conflicts. The lack of HN support dramatically affected how the combat engineer battalions dealt with their problems. Further study of OIF is necessary as the Iraqi government becomes more established and self-sufficient. These changes will influence how the military conducts its stability and reconstruction operations. Also, more study is required in stability and reconstruction operations when a regime change does not occur and how this impacts operations.

The Engineer Regiment continues to transform to meet the objectives of the FEF as OIF continues. The newly formed engineer units are just now being deployed to support operations in OIF. It is not yet known what bearing these units will have in stabilizing and rebuilding Iraq. As these units conduct operations it would be beneficial to consolidate observations, lessons learned, and after-action reviews (AARs) to fully understand the effects that the FEF has on stability and reconstruction operations.

Coalition and joint partners provide additional capabilities and resources that assist in the execution of operations. This thesis did not discuss the role of the coalition members or other military services and their contribution to OIF, but their support cannot

be overlooked. These partners provided training, equipment, and manpower that influenced the progression of the stability and reconstruction operations. More research is necessary to determine the long term impact of coalition and joint operations.

Other agencies within the United States government also provided additional capabilities and resources. This thesis only briefly highlighted some of the assistance provided by USACE, however, there are many other agencies providing assistance in OIF. The Office of Reconstruction and Humanitarian Assistance, the United States Agency for International Development, and the Department of State are just a few of the agencies operating in Iraq. While interaction between the Army and these agencies continues to improve, more study is required to understand the problems and solutions developed between the agencies. This additional study could yield important lessons for future stability and reconstruction operations.

Each conflict the United States participates in poses new problems to our Armed Forces. OIF has posed the challenge of simultaneously implementing a regime change, rebuilding a nation, and fighting insurgency while restructuring our own forces. Each branch of the Army is forced to find solutions to new problems encountered in OIF; the Engineer branch is no different. Implementing modifications discussed here as well as modifications suggested from further study will allow our FEF to adapt quickly to any situation that presents itself, allowing missions to be completed with increasing efficiency.

GLOSSARY

Area of Operations (AO). An operational area defined by the joint force commander for land and naval forces. Areas of operations do not typically encompass the entire operational area of the joint force commander, but should be large enough for component commanders to accomplish their missions and protect their forces (FM 1-02 2004a, 1-12).

Capability. The capacity to be used, treated, or developed for a specific purpose (Houghton Mifflin Company 1985, 236).

Civil Augmentation Program. Standing, long-term contracts designed to augment service logistic capabilities with contract support in both preplanned and short notice contingencies; examples include US Army Logistics Civilian Augmentation Program (LOGCAP), US Air Force Contract Augmentation Program, and US Navy Construction Capabilities Contract (FM 3-34 2004b, Glossary-7).

Civil Engineering (CE). Those combat support (CS) and combat service support (CSS) activities that identify, design, construct, lease, or provide facilities and which operate, maintain, and perform war damage repair and other engineering functions in support of military operations (FM 3-34 2004b, Glossary-7).

Civil-Military Operations (CMO). The activities of a commander that establish, maintain, influence, or exploit relations between military forces, governmental and nongovernmental civilian organizations and authorities, and the civilian populace in a friendly, neutral, or hostile operational area in order to facilitate military operations, to consolidate and achieve US objectives (FM 1-02 2004a, 1-30).

Combat Engineering. Those engineering tasks that assist the tactical and/or operational commander to shape the battlespace by enhancing mobility, creating the space or time necessary to generate mass and speed while protecting the force, and denying mobility and key terrain to the enemy; these tasks include breaching, bridging and emplacement of obstacles to deny mobility to the enemy; one of the engineer battlespace functions that includes mobility, countermobility, and survivability (FM 3-34 2004b, Glossary-8).

Command and Control. The exercise of authority and direction by a properly designated commander over assigned and attached forces in the accomplishment of the mission. Command and control functions are performed through an arrangement of personnel, equipment, communications, facilities, and procedures employed by a commander in planning, directing, coordinating, and controlling forces and operations in the accomplishment of the mission (FM 1-02 2004a, 1-37).

Commander. One who is in command because of rank, position, or other circumstances (FM 1-02 2004a, 1-38).

Contract. An agreement between two or more parties, especially one that is written and enforceable by law (Houghton Mifflin Company 1985, 317).

Engineer Regiment. All active component (AC) and reserve component (RC) engineer organizations (as well as the DOD civilians and affiliated contractors and agencies within the civilian community) with a diverse range of capabilities that are all focused toward supporting the Army and its warfighting mission (FM 3-34 2004b, Glossary-14).

Explosive Ordnance Disposal (EOD). The detection, identification, on-site evaluation, rendering safe, recovery, and final disposal of unexploded explosive ordnance. It may also include explosive ordnance which has become hazardous by damage or deterioration (FM 1-02, 2004a, 1-76).

Future Engineer Force (FEF). The engineer force that provides critical modular, scalable, mission-tailored, multi-functional capabilities for the Army. The Future Engineer Force represents continual improvement and is designed to look ten to twenty years into the future to determine the capabilities and the organizational and functional architecture of modular engineer units that will support capabilities-based brigade combat teams (The United States Army Future Engineer Force Concept Capability Plan 2005b, 2-1).

General Engineering (GE). Encompasses the construction and repair of lines of communication (LOCs), main supply routes (MSRs), airfields, and logistic facilities to support joint military operations and may be performed in direct support (DS) of combat operations, such as battle damage repair; these operations include both horizontal and vertical construction, and may include use of both expedient repair methods and more deliberate construction methods characterized by the application of design criteria, advanced planning, and preparation, depending on the mission requirements; one of the engineer battlespace functions (FM 3-34 2004b, Glossary-20).

Host Nation Support. Civil and/or military assistance rendered by a nation to foreign forces within its territory during peacetime, crises, or emergencies, or war based on agreements mutually concluded between nations (FM 1-02 2004a, 1-94).

Insurgency. An organized movement aimed at the overthrow of a constituted government through the use of subversion and armed conflict (FM 1-02 2004a, 1-101).

Mission-Essential Task List (METL). A compilation of collective mission-essential tasks an organization must perform successfully to accomplish its wartime mission(s) (FM 1-02 2004a, 1-126).

Offensive Operations. Operations which aim at destroying or defeating an enemy. Their purpose is to impose US will on the enemy and achieve decisive victory (FM 1-02 2004a, 1-137).

Priority of Support. Priorities set by the commander in his concept of operations and during execution to ensure combat support and combat service support are provided to subordinate elements in accordance with their relative importance to accomplishing the mission (FM 1-02 2004a, 1-150).

Stability and Reconstruction (S&R) Operations. The sustainment and exploitation of security and control over areas, populations, and resources. Stability and reconstruction operations employ military capabilities to reconstruct or establish services and support civilian agencies. Stability and reconstruction operations involve both coercive and cooperative actions and may occur before, during, and after offensive and defensive operations; however, they also occur separately, usually at the lower end of the range of military operations. Stability and reconstruction operations lead to an environment in which, in cooperation with a legitimate government, the other instruments of national power can predominate (FM 1 2005a, 3-7).

Theater. The geographical area outside the continental United States for which a commander of a combatant command has been assigned responsibility (FM 1-02 2004a, 1-187).

Training. The instruction of personnel to increase their capacity to perform specific military functions and associated individual and collective tasks (FM 7-0 2002, Glossary-15).

Urban Operations. Offense, defense, stability, and support operations conducted in a topographical complex and adjacent natural terrain where manmade construction and high population density are the dominant features (FM 1-02 2004a, 1-196).

Versatility. The ability of Army forces to meet the global, diverse mission requirements of full-spectrum operations (FM 1-02 2004a, 1-196).

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